APPROVED BY DRAFTSMAN | O.G. FIG. | CLASS | SUBCLASS

Fig.1

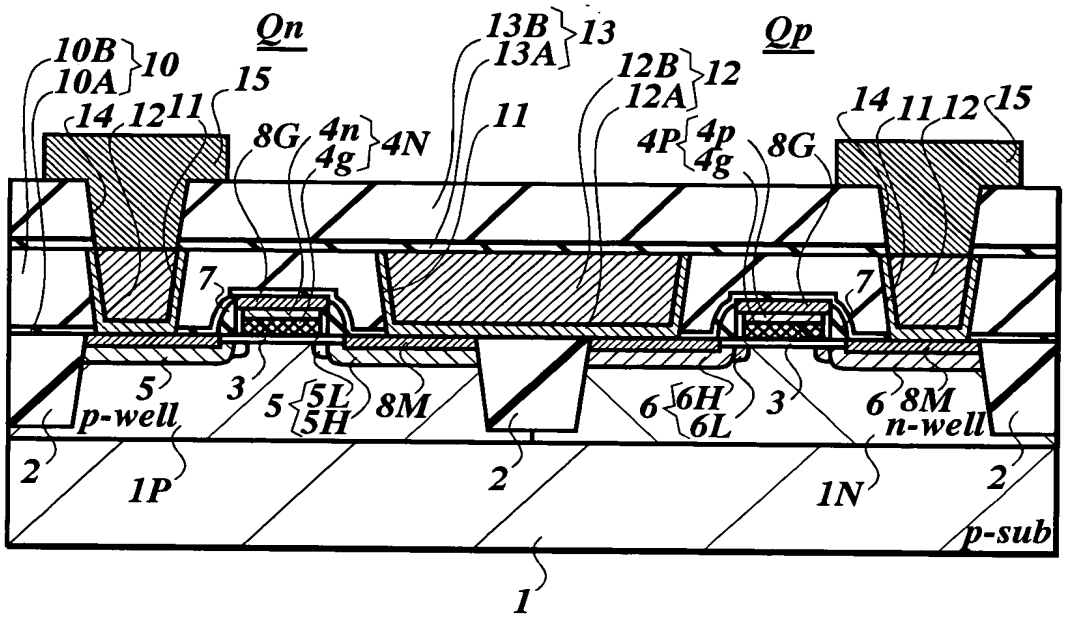
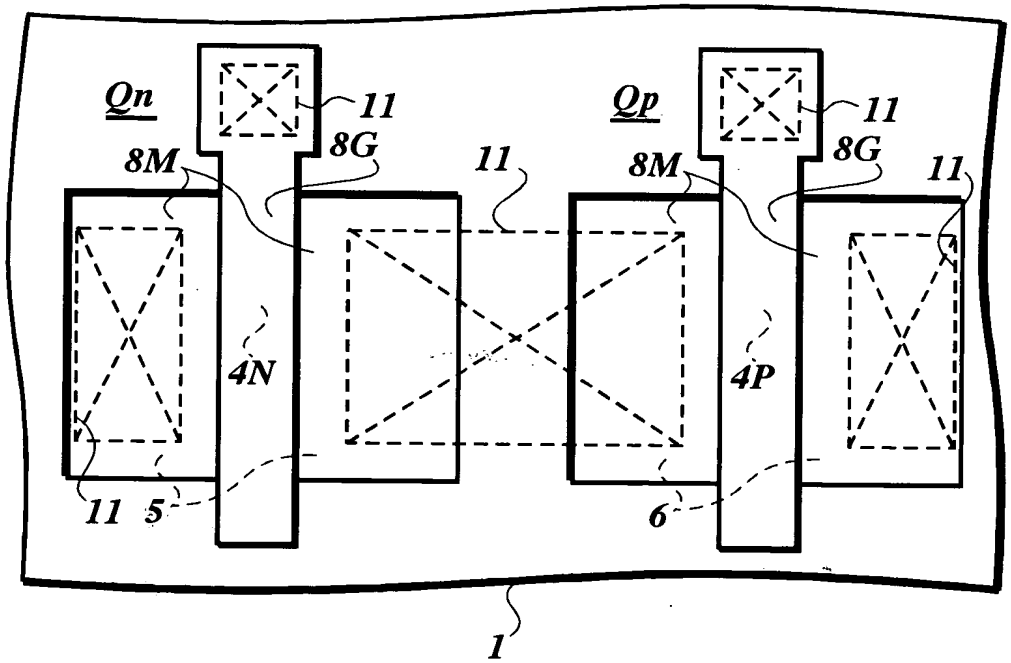


Fig.2



APPROVED BY DRAFTSMAN | O.G. FIG. | CLASS | SUBCLASS

Fig.3

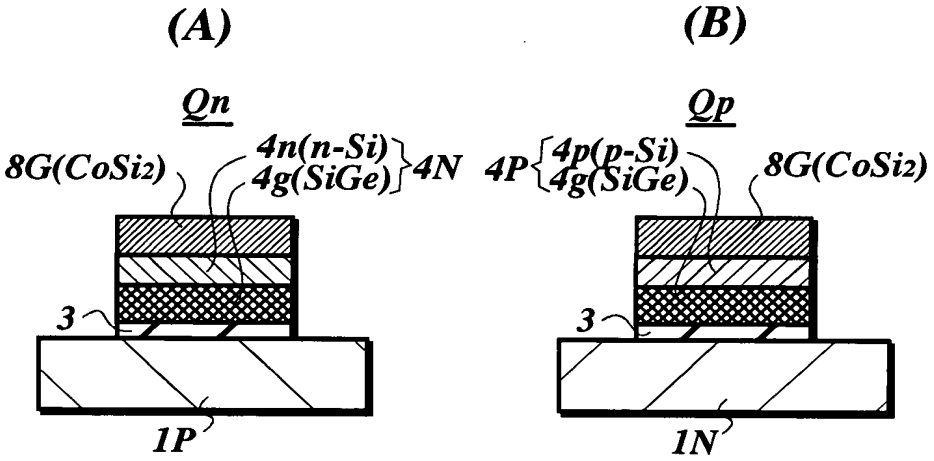


Fig.4

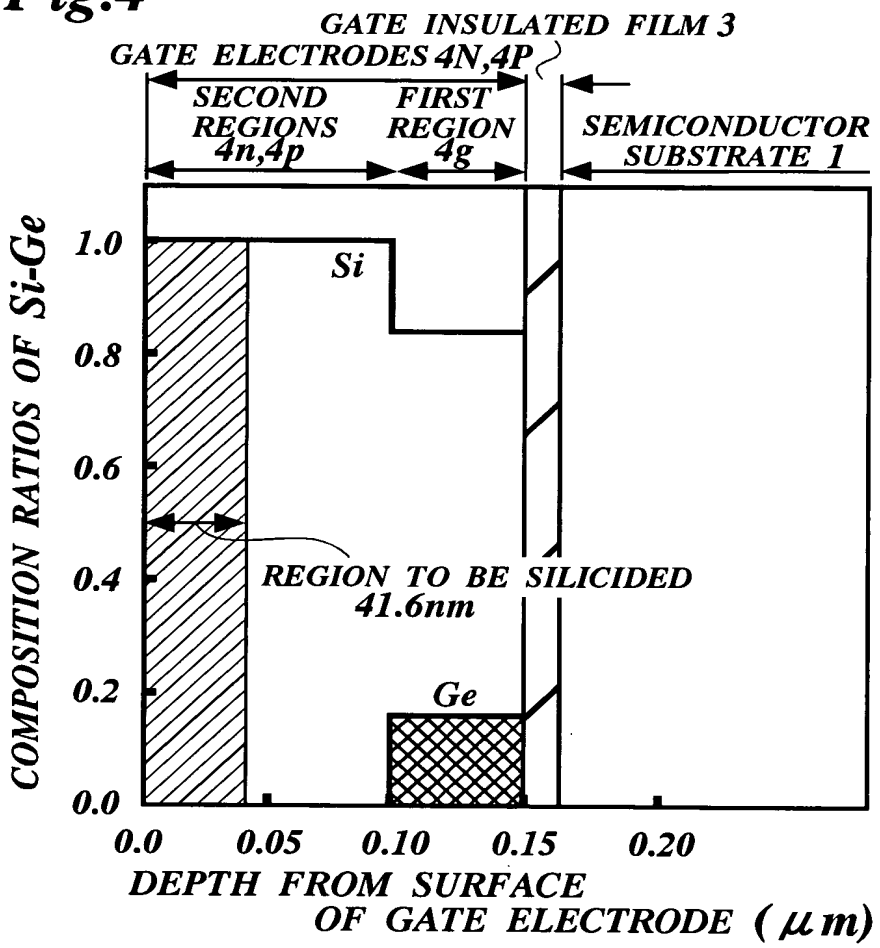


Fig.5

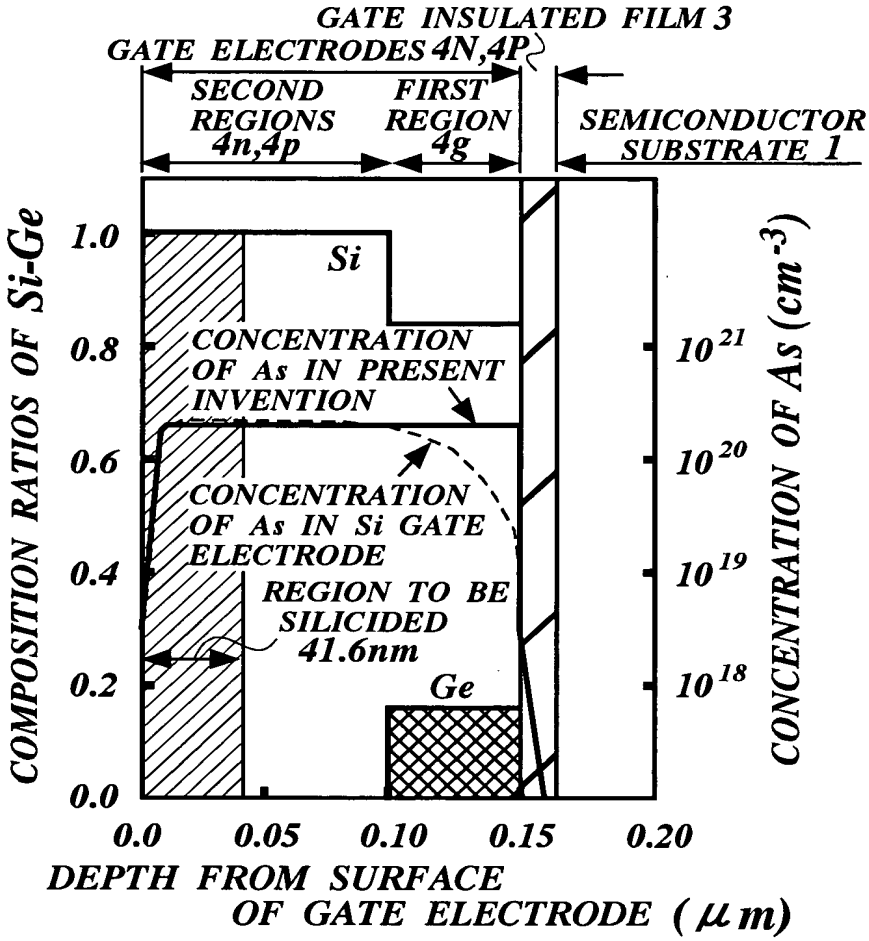

GATE INSULATED FILM 3
GATE ELECTRODES 4N,4P
SECOND REGIONS 4n,4p
FIRST REGION 4g
SEMICONDUCTOR SUBSTRATE 1
Si
Ge
CONCENTRATION OF As IN PRESENT INVENTION
CONCENTRATION OF As IN Si GATE ELECTRODE
REGION TO BE SILICIDED
41.6nm
COMPOSITION RATIOS OF Si-Ge
1.0
0.8
0.6
0.4
0.2
0.0
CONCENTRATION OF As (cm-3)
10 21
10 20
10 19
10 18
0.0
0.05
0.10
0.15
0.20
DEPTH FROM SURFACE OF GATE ELECTRODE (μm)

Fig.6

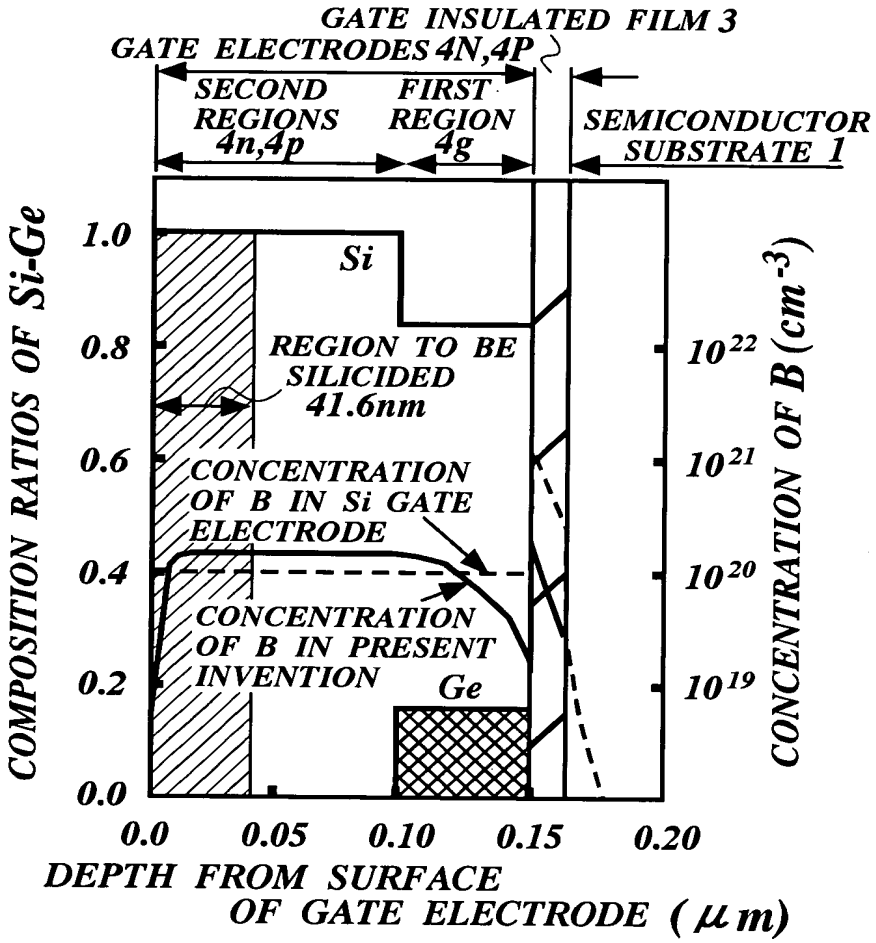

GATE INSULATED FILM 3
GATE ELECTRODES 4N,4P
SECOND REGIONS 4n,4p
FIRST REGION 4g
SEMICONDUCTOR SUBSTRATE 1
Si
REGION TO BE SILICIDED 41.6nm
CONCENTRATION OF B IN Si GATE ELECTRODE
CONCENTRATION OF B IN PRESENT INVENTION
Ge
COMPOSITION RATIOS OF Si-Ge
1.0
0.8
0.6
0.4
0.2
0.0
CONCENTRATION OF B (cm-3)
10^22
10^21
10^20
10^19
0.0
0.05
0.10
0.15
0.20
DEPTH FROM SURFACE OF GATE ELECTRODE (μm)

Fig.7

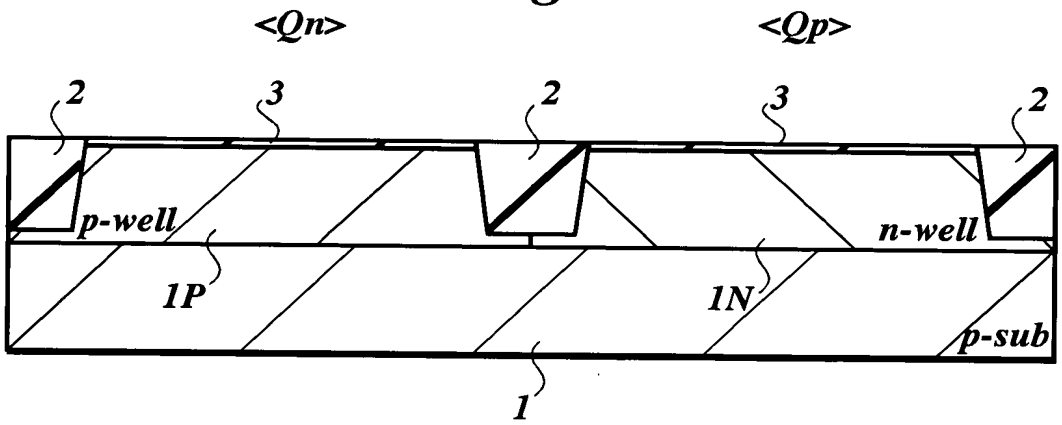


Fig.8

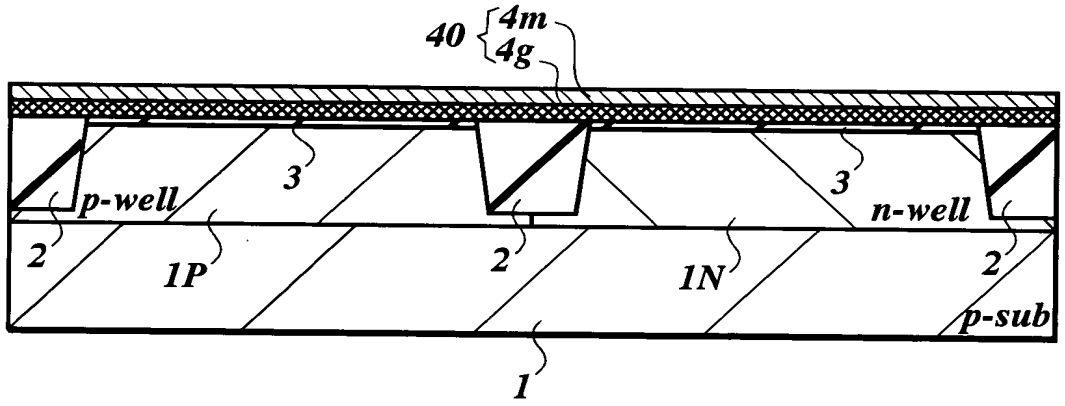


Fig.9

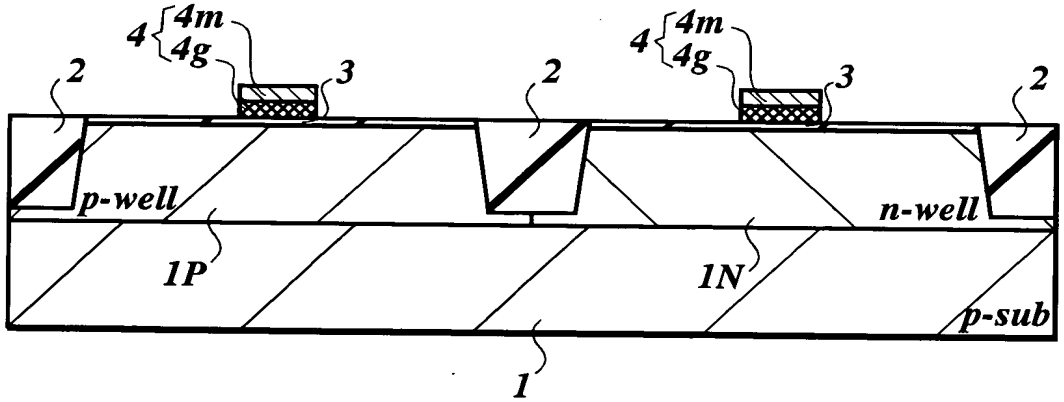


Fig.10

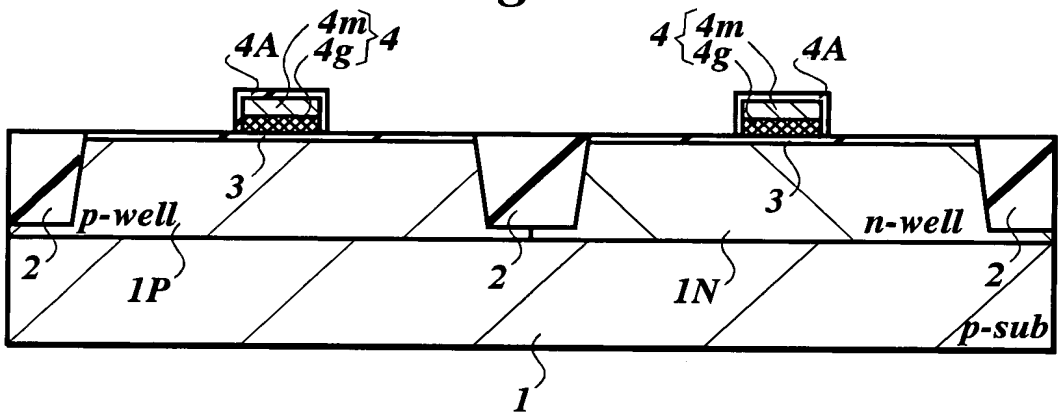


Fig.11

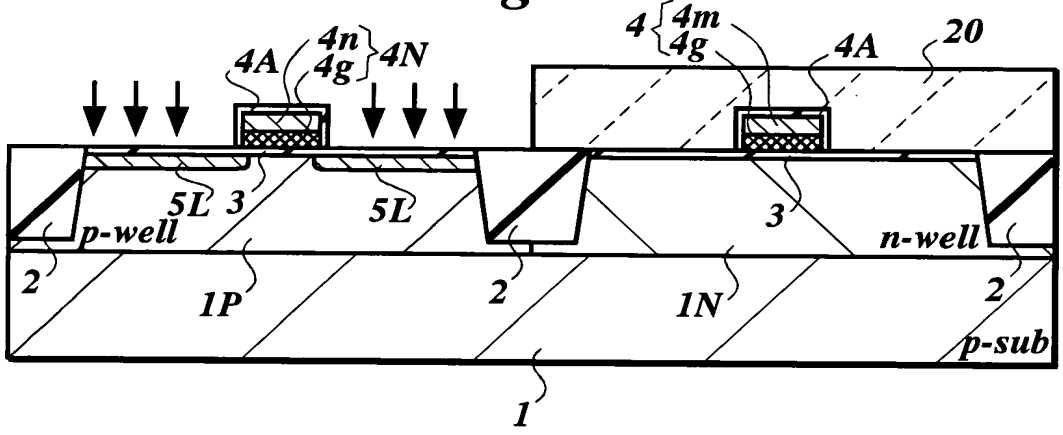
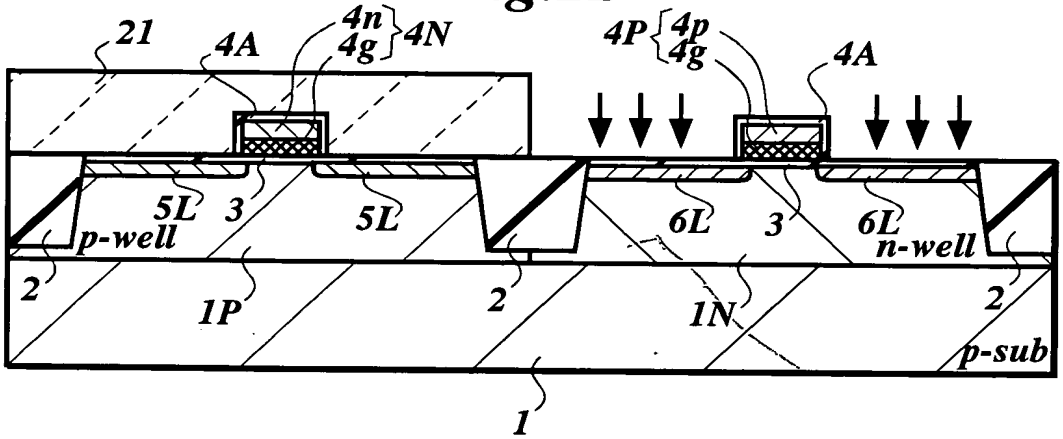


Fig.12



0 9 3 6 2 6 4 - 0 0 0 0 0 1

Fig.13

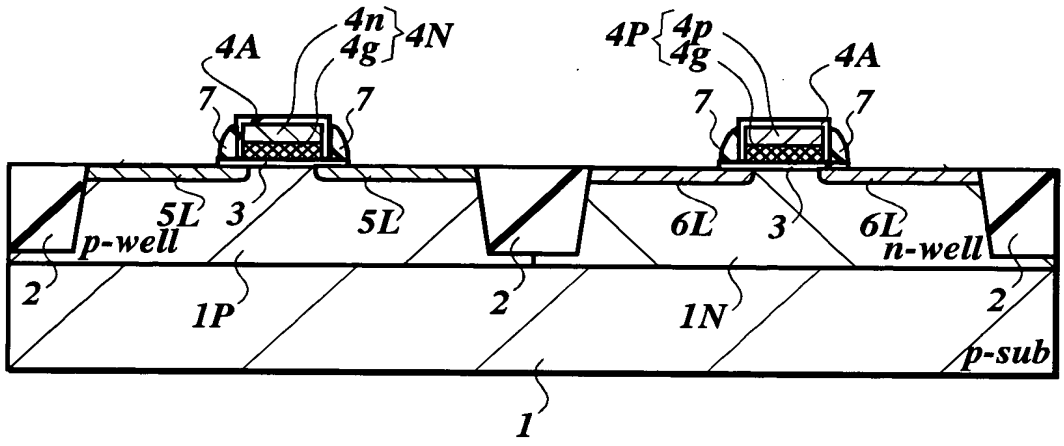


Fig.14

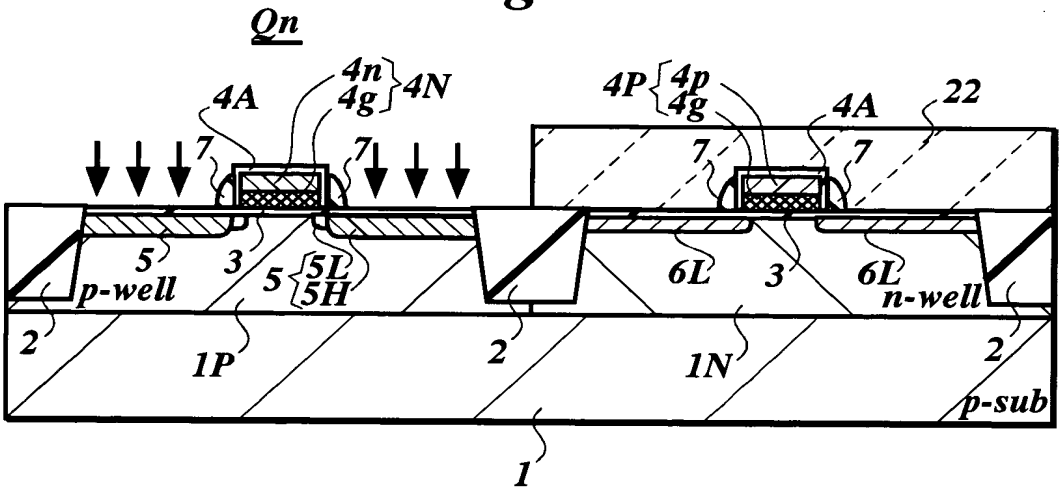


Fig.15

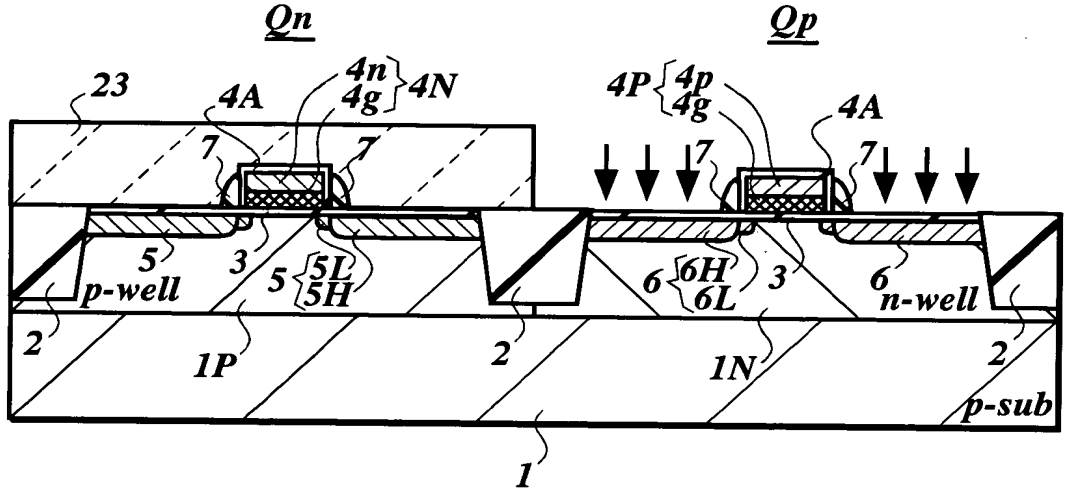

Qn
Qp
23
4A
4n
4g
4N
4P
4p
4g
4A
7
7
7
7
5
p-well
3
5
5L
5H
6
6H
6L
3
6
n-well
2
1P
2
1N
2
p-sub
1

Fig.16

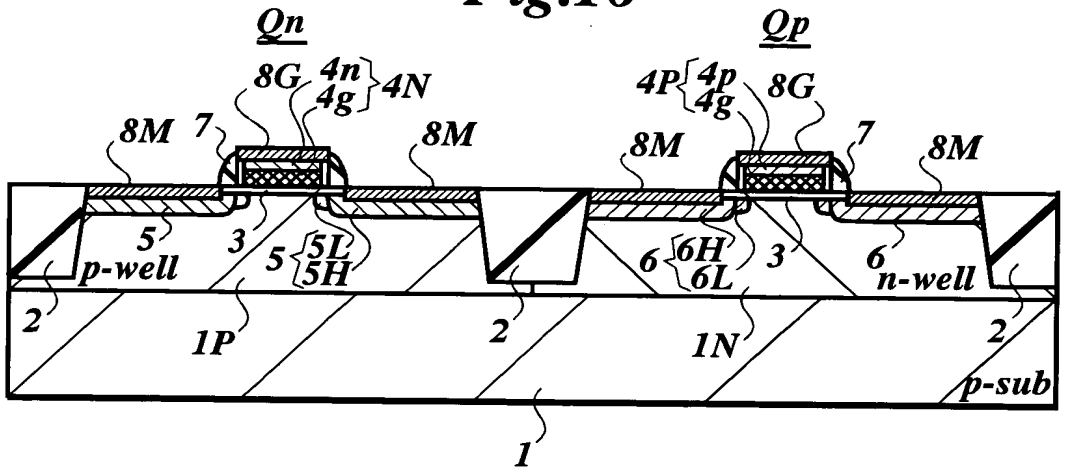

Qn
Qp
8G
4n
4g
4N
4P
4p
4g
8G
8M
7
8M
8M
7
8M
5
p-well
3
5
5L
5H
6
6H
6L
3
6
n-well
2
1P
2
1N
2
p-sub
1

Fig.17

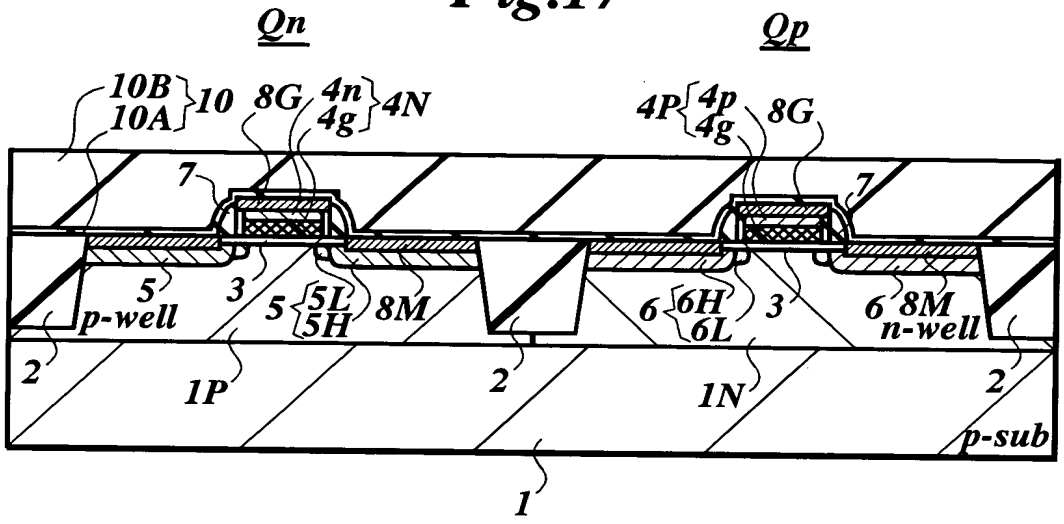

Qn
Qp
10B
10A
10
8G
4n
4g
4N
4P
4p
4g
8G
7
7
5
p-well
3
5
5L
5H
8M
6
6H
6L
3
6
8M
n-well
2
1P
2
1N
2
p-sub
1

Fig.18

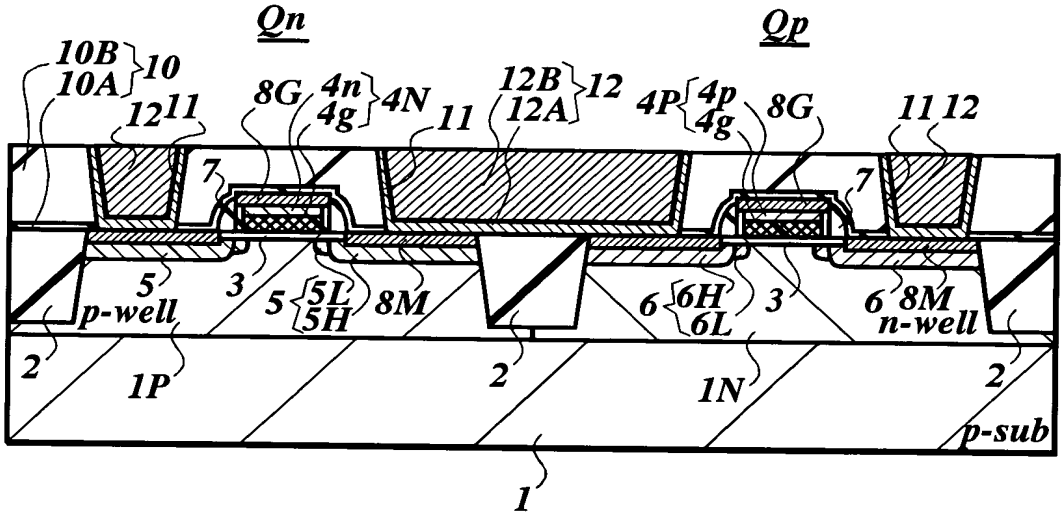

Qn
Qp
10B
10A
10
12
11
8G
4n
4g
4N
11
12B
12A
12
4P
4p
4g
8G
11
12
7
7
5
p-well
3
5
5L
5H
8M
6
6H
6L
3
6
8M
n-well
2
1P
2
1N
2
p-sub
1

Fig.19

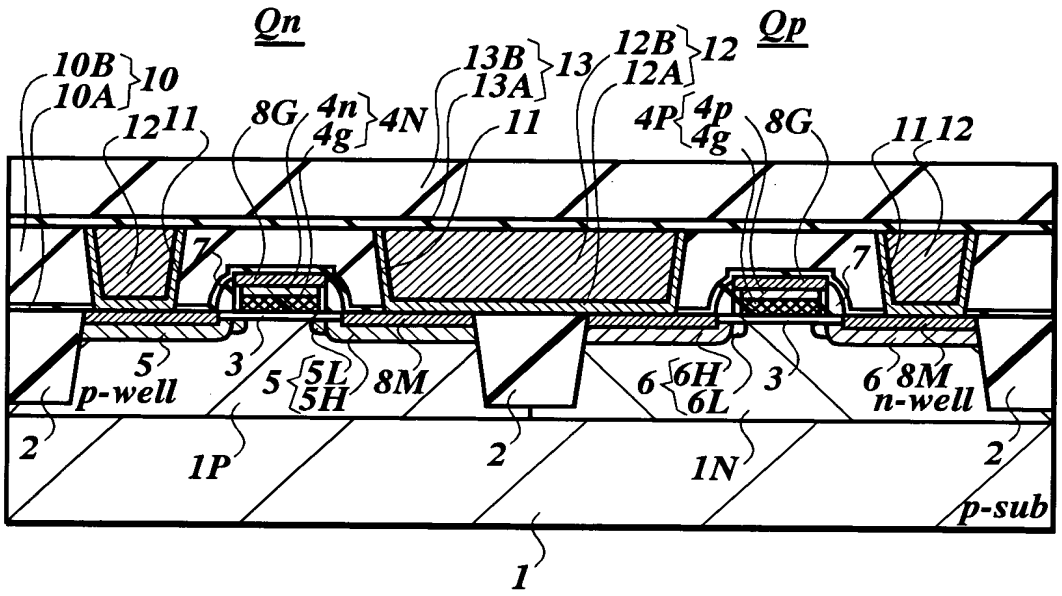

Qn
Qp
10B
10A
10
12
11
8G
4n
4g
4N
13B
13A
13
11
12B
12A
12
4P
4p
4g
8G
11
12
7
7
5
p-well
3
5
5L
5H
8M
6
6H
6L
3
6
8M
n-well
2
1P
2
1N
2
p-sub
1

Fig.20

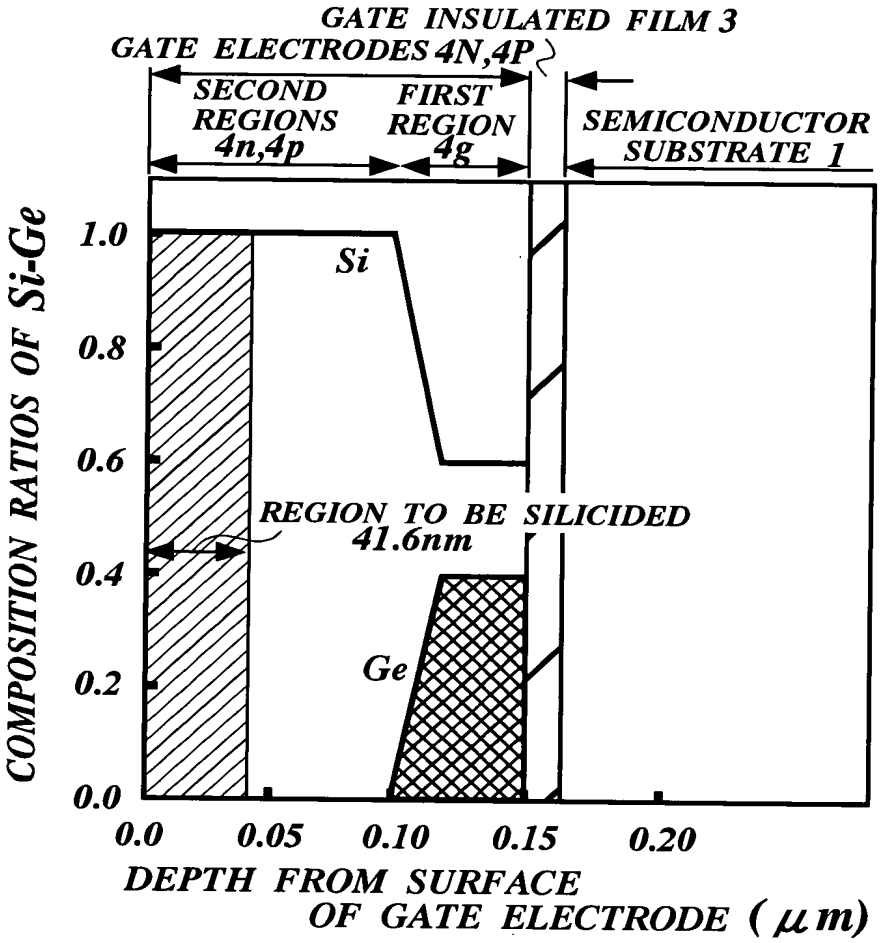

GATE INSULATED FILM 3
GATE ELECTRODES 4N,4P
SECOND REGIONS 4n,4p
FIRST REGION 4g
SEMICONDUCTOR SUBSTRATE 1
COMPOSITION RATIOS OF Si-Ge
1.0
0.8
0.6
0.4
0.2
0.0
Si
Ge
REGION TO BE SILICIDED
41.6nm
0.0
0.05
0.10
0.15
0.20
DEPTH FROM SURFACE OF GATE ELECTRODE (μm)

Fig.21

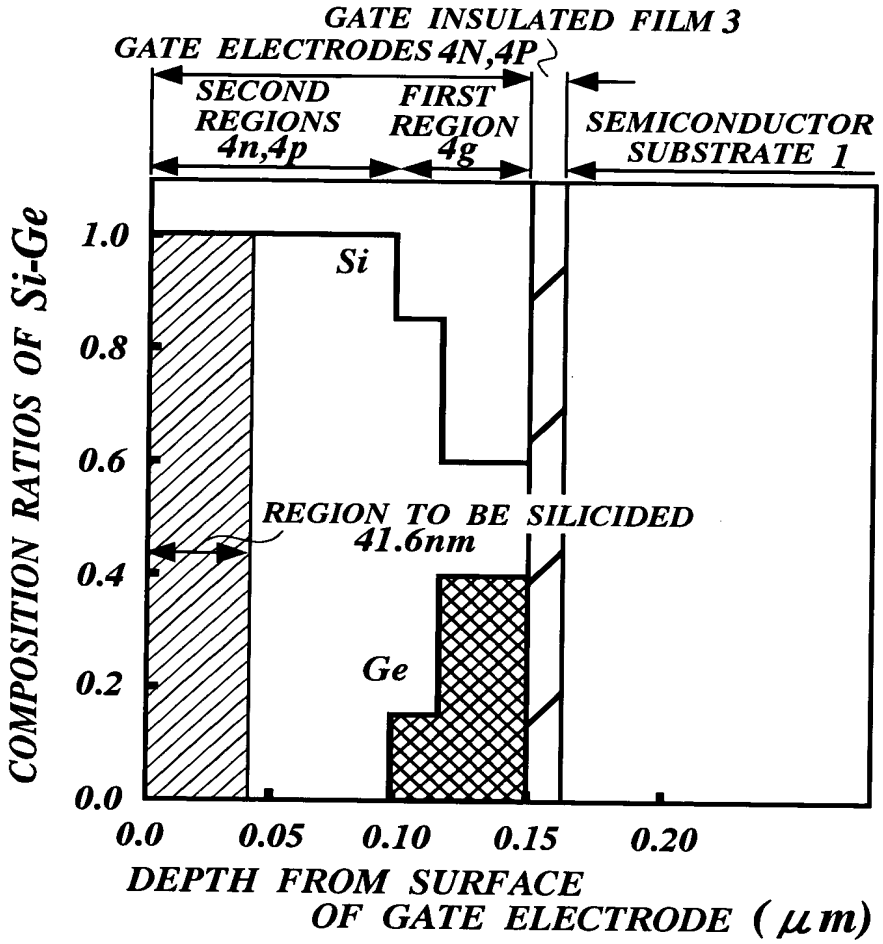

GATE INSULATED FILM 3
GATE ELECTRODES 4N,4P
SECOND REGIONS 4n,4p
FIRST REGION 4g
SEMICONDUCTOR SUBSTRATE 1
COMPOSITION RATIOS OF Si-Ge
1.0
0.8
0.6
0.4
0.2
0.0
Si
Ge
REGION TO BE SILICIDED 41.6nm
0.0
0.05
0.10
0.15
0.20
DEPTH FROM SURFACE OF GATE ELECTRODE (μm)

Fig.22 (A)

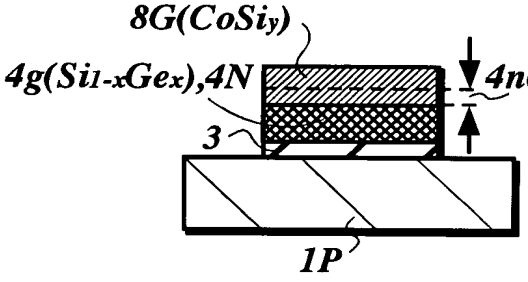


Fig.22 (B)

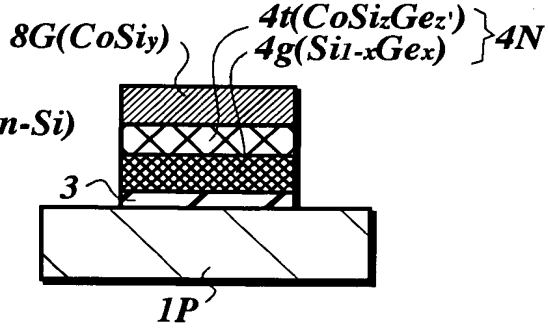


Fig.22 (C)

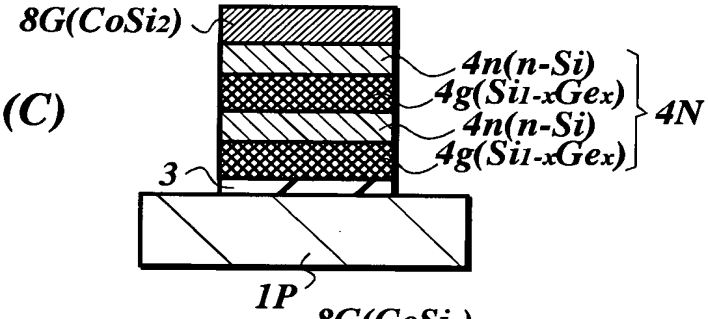


Fig.22 (D)

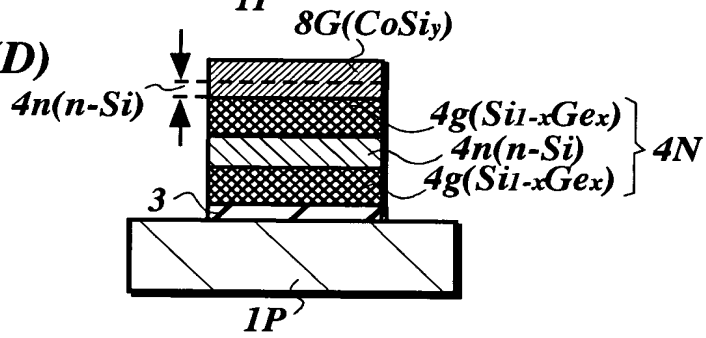


Fig.22 (E)

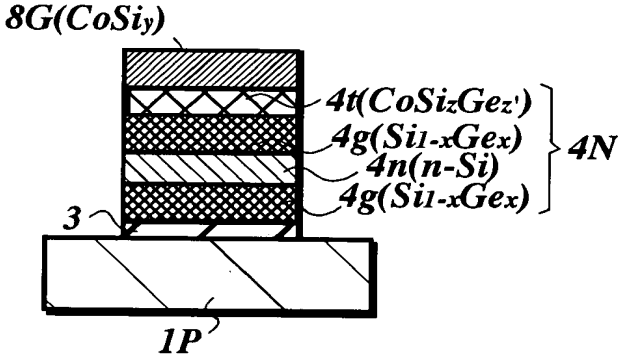


Fig.23

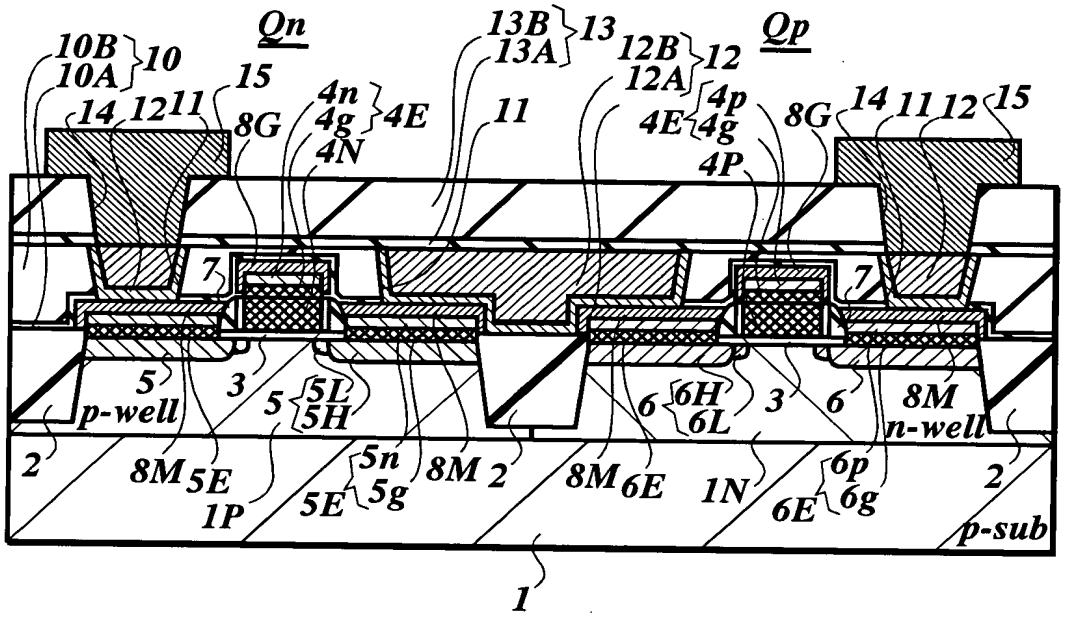

Qn
Qp
10B
10A
10
15
14
12
11
8G
4n
4g
4E
4N
13B
13A
13
11
12B
12A
12
4p
4E
4g
4P
8G
14
11
12
15
7
7
5
p-well
3
5
5L
5H
6
6H
6L
3
6
8M
n-well
2
8M
5E
1P
5E
5n
5g
8M
2
8M
6E
1N
6E
6p
6g
2
p-sub
1

Fig.24

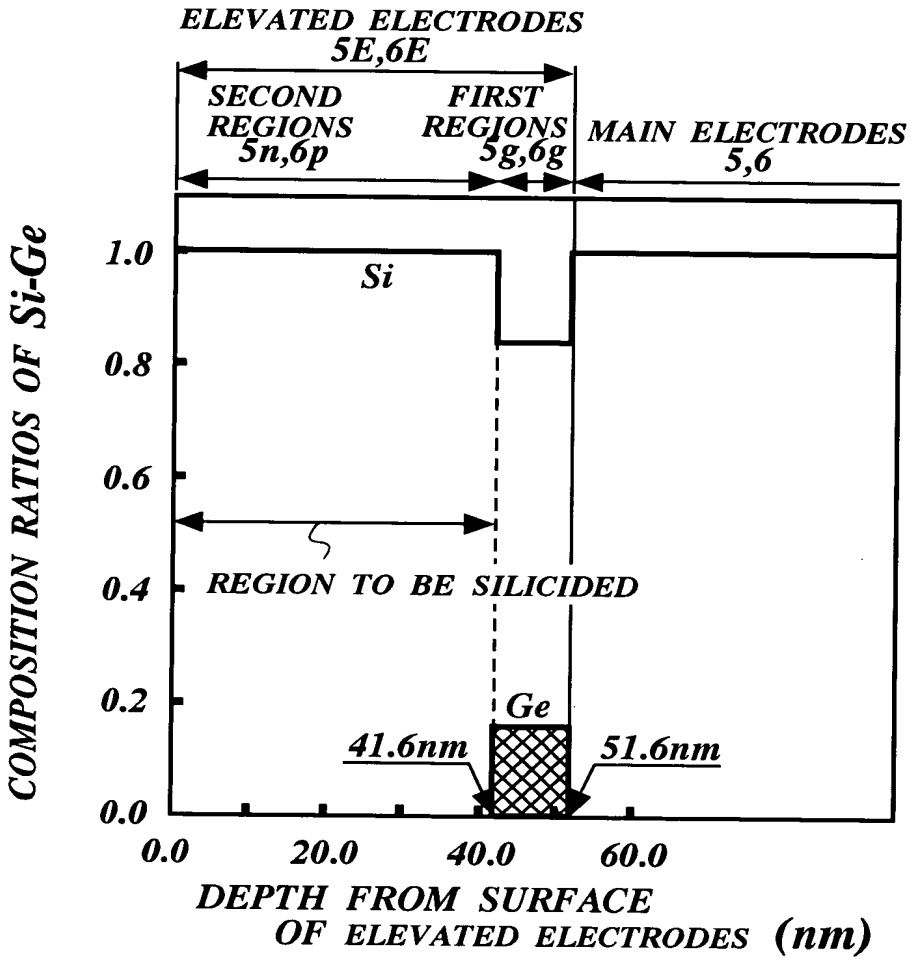

ELEVATED ELECTRODES
5E,6E
SECOND REGIONS
5n,6p
FIRST REGIONS
5g,6g
MAIN ELECTRODES
5,6
COMPOSITION RATIOS OF Si-Ge
1.0
0.8
0.6
0.4
0.2
0.0
Si
REGION TO BE SILICIDED
Ge
41.6nm
51.6nm
0.0
20.0
40.0
60.0
DEPTH FROM SURFACE
OF ELEVATED ELECTRODES (nm)

Fig.25

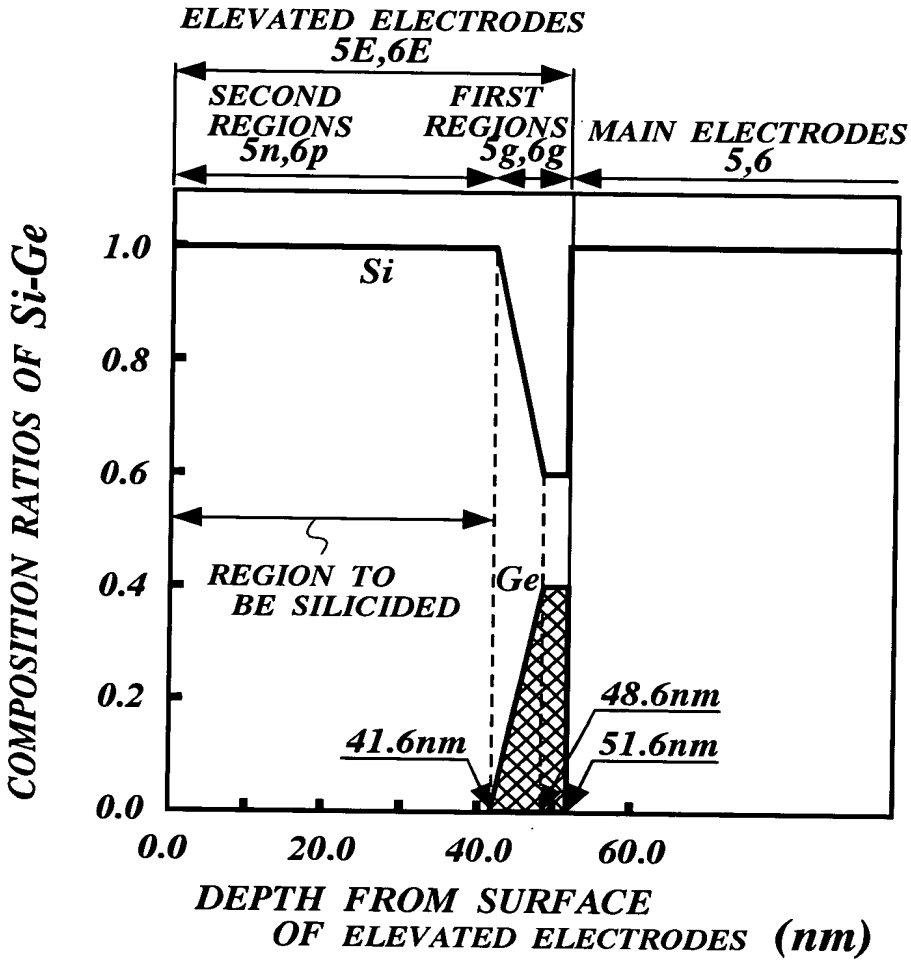

ELEVATED ELECTRODES
5E,6E
SECOND REGIONS
5n,6p
FIRST REGIONS
5g,6g
MAIN ELECTRODES
5,6
COMPOSITION RATIOS OF Si-Ge
1.0
0.8
0.6
0.4
0.2
0.0
Si
Ge
REGION TO BE SILICIDED
41.6nm
48.6nm
51.6nm
0.0
20.0
40.0
60.0
DEPTH FROM SURFACE OF ELEVATED ELECTRODES (nm)

Fig.26

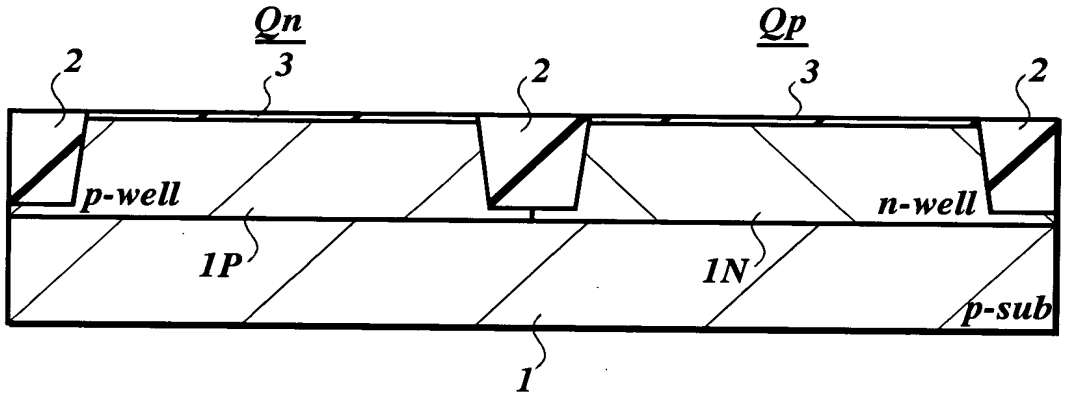


Fig.27

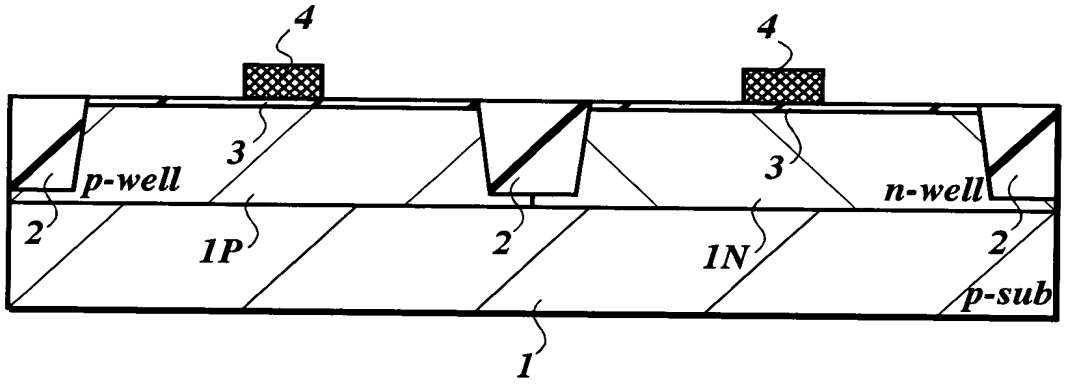


Fig.28

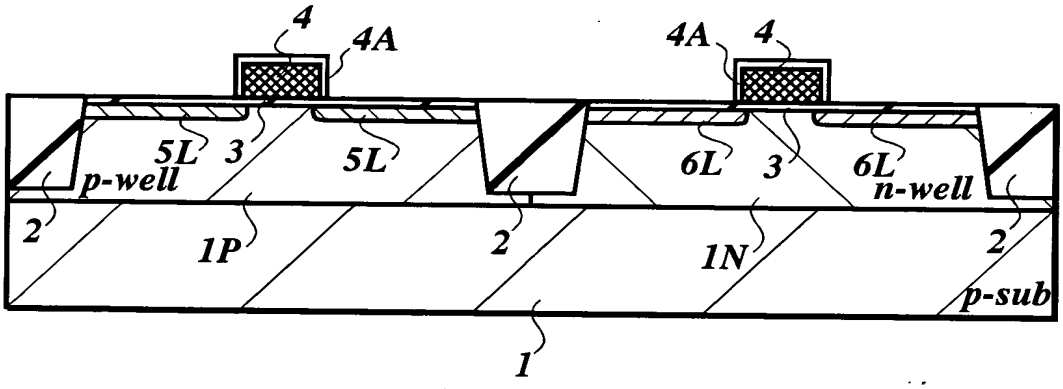


Fig.29

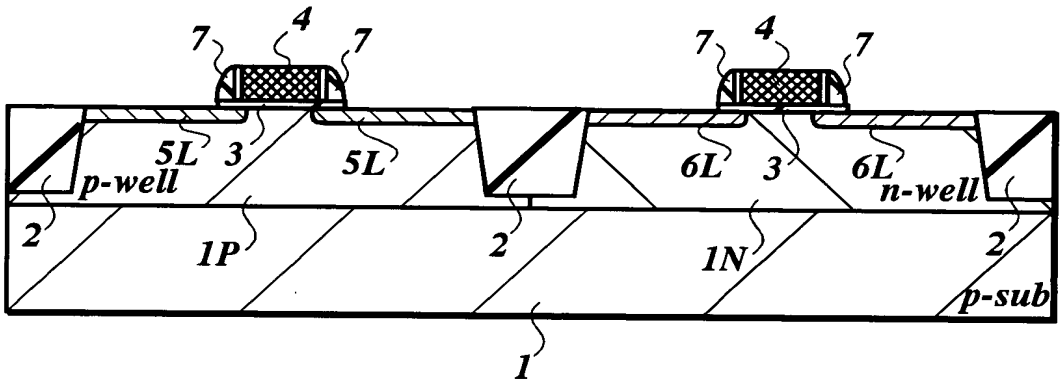

7
4
7
7
4
7
5L
3
5L
6L
3
6L
p-well
n-well
2
1P
2
1N
2
p-sub
1

Fig.30

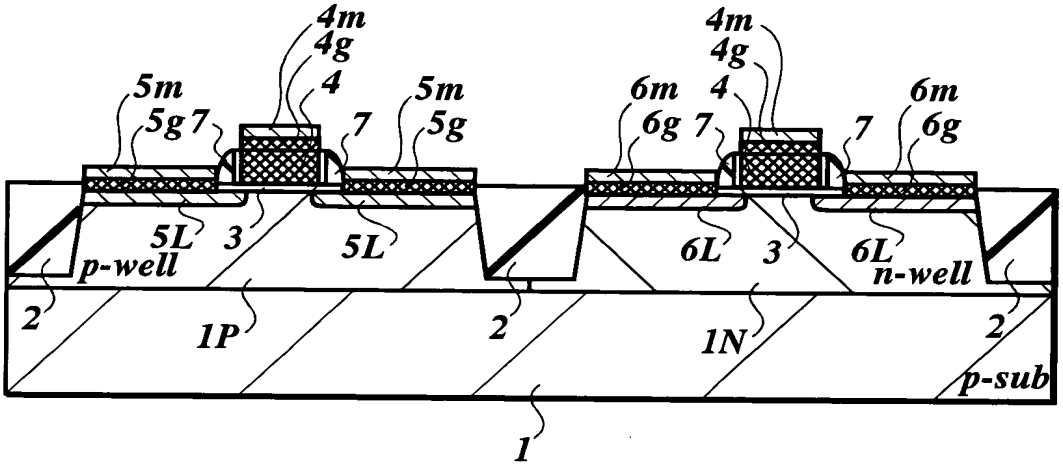

4m
4g
4
5m
5g
7
7
5m
5g
4m
4g
4
6m
6g
7
7
6m
6g
5L
3
5L
6L
3
6L
p-well
n-well
2
1P
2
1N
2
p-sub
1

Fig.31

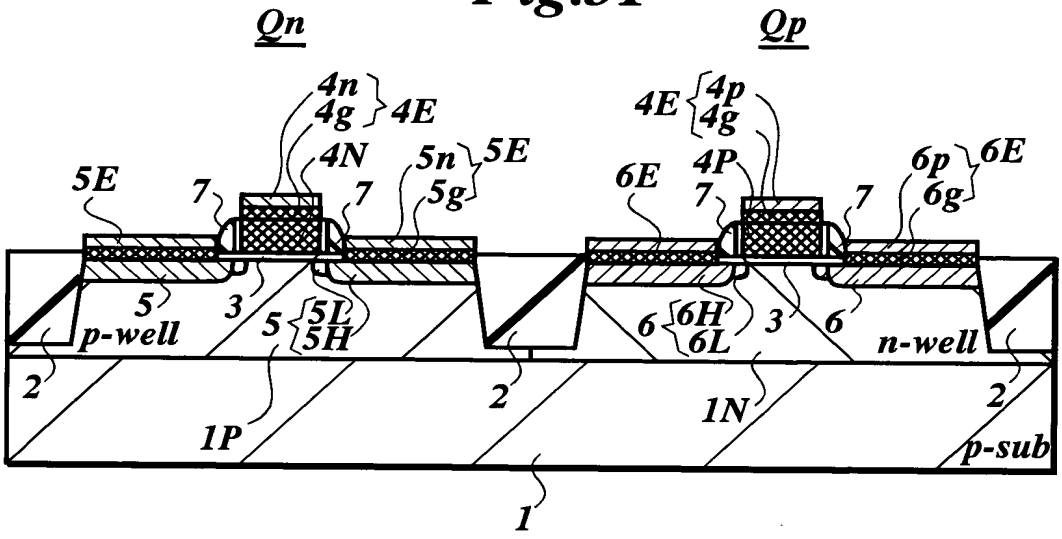

Qn
Qp
4n
4g
4E
4N
5n
5g
5E
7
6E
4P
4p
6p
6g
6H
6L
5L
5H
3
6
p-well
n-well
p-sub
1P
1N
1
2

Fig.32

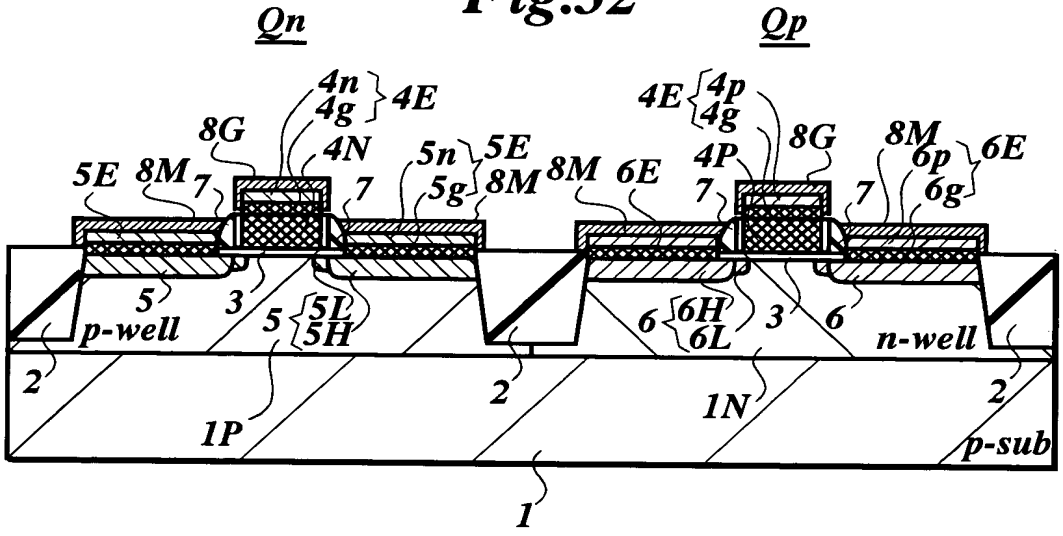
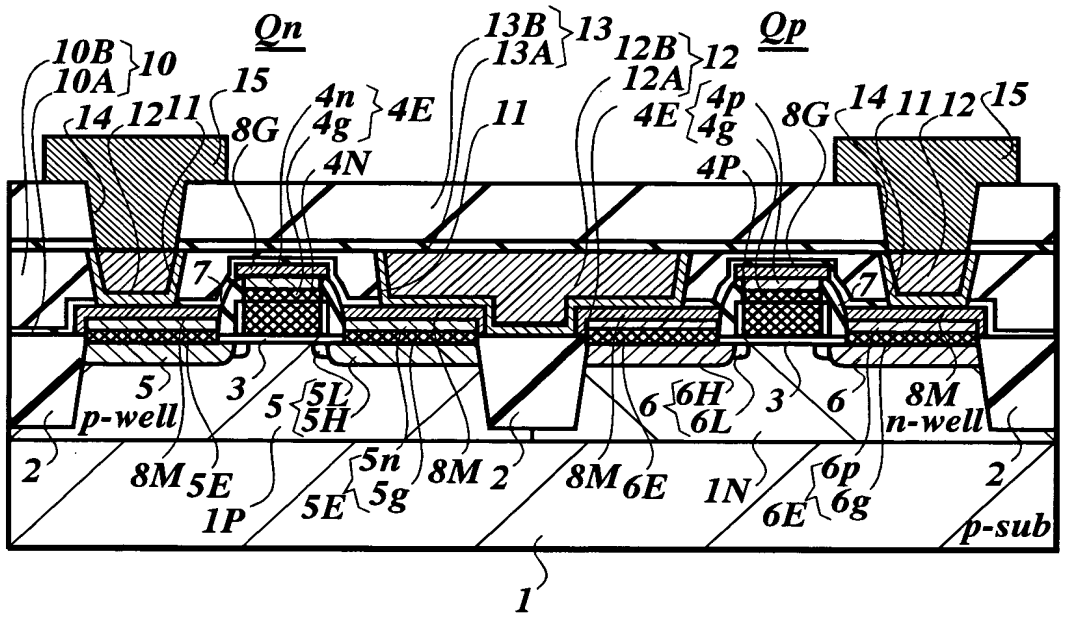

Qn
Qp
4n
4g
4E
8G
4N
5n
5g
5E
8M
7
6E
4P
4p
6p
6g
6H
6L
5L
5H
3
6
p-well
n-well
p-sub
1P
1N
1
2

Fig.33


Qn
Qp
10B
10A
10
15
14
12
11
8G
4n
4g
4E
4N
13B
13A
13
11
12B
12A
12
4E
4p
4g
4P
8G
14
11
12
15
7
7
5
p-well
3
5
5L
5H
6
6H
6L
3
6
8M
n-well
2
8M
5E
1P
5E
5n
5g
8M
2
8M
6E
1N
6E
6p
6g
2
p-sub
1

APPROVED BY DRAFTSMAN | O.G. FIG. | CLASS | SUBCLASS

Fig.34

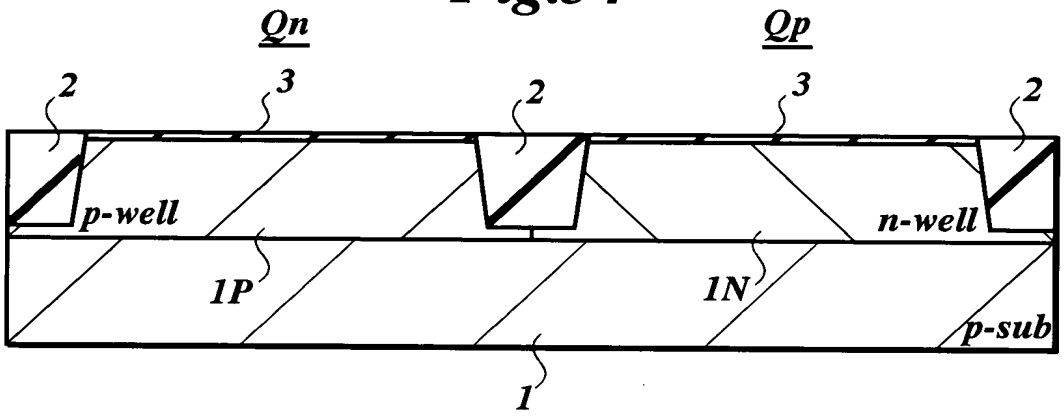


Fig.35

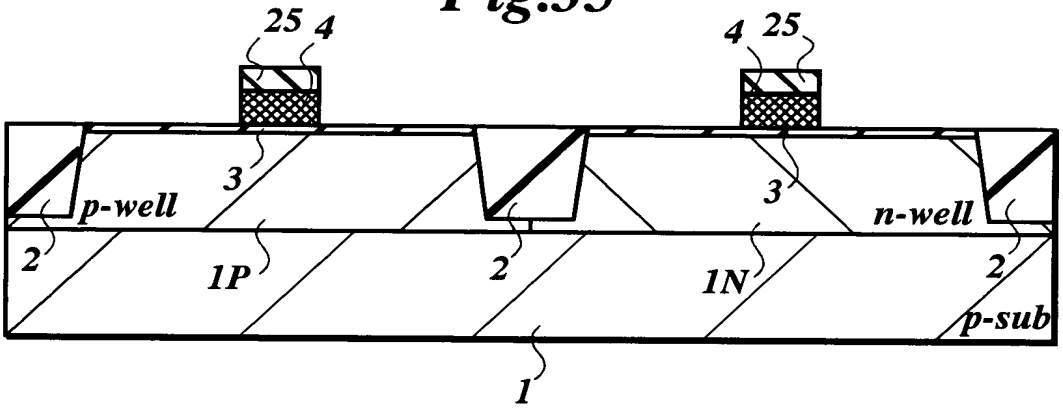
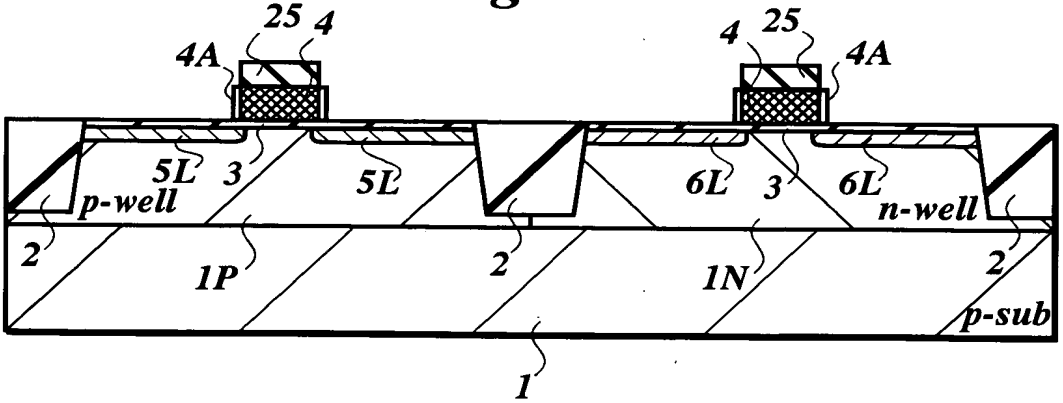


Fig.36



US 6,545,313 B2

Fig.37

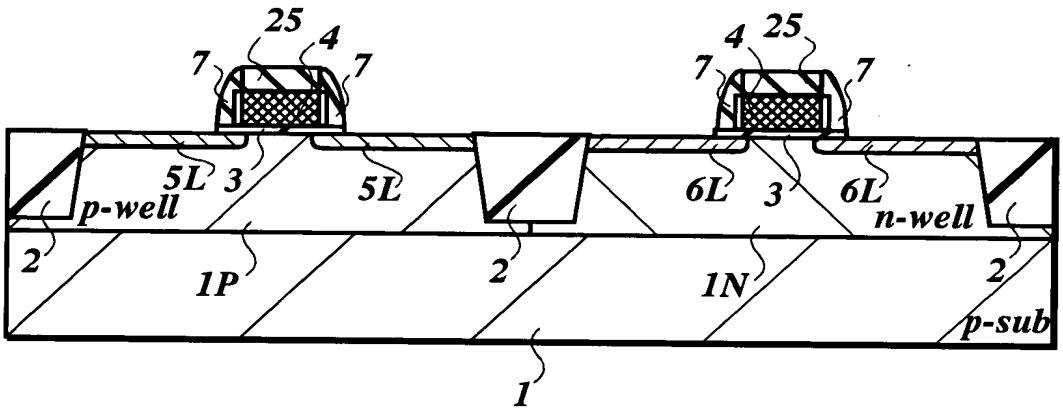


Fig.38

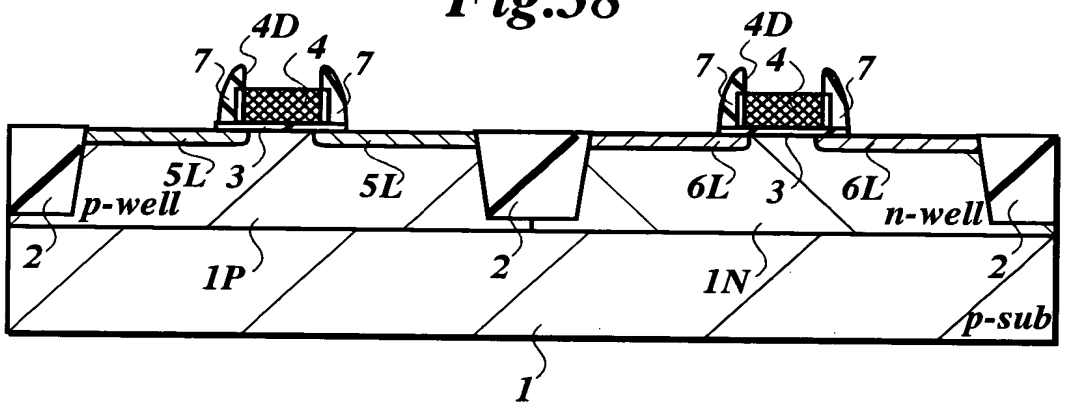


Fig.39

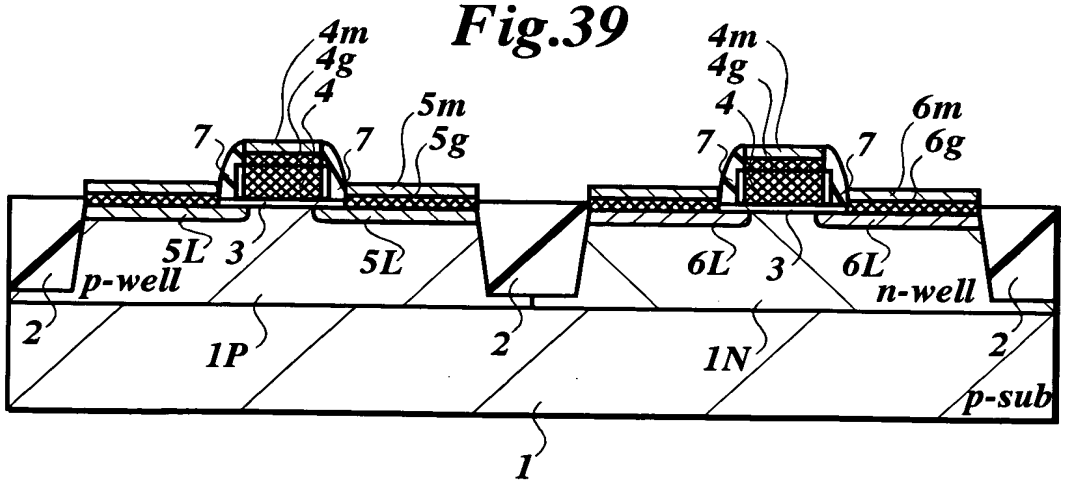


Fig.40

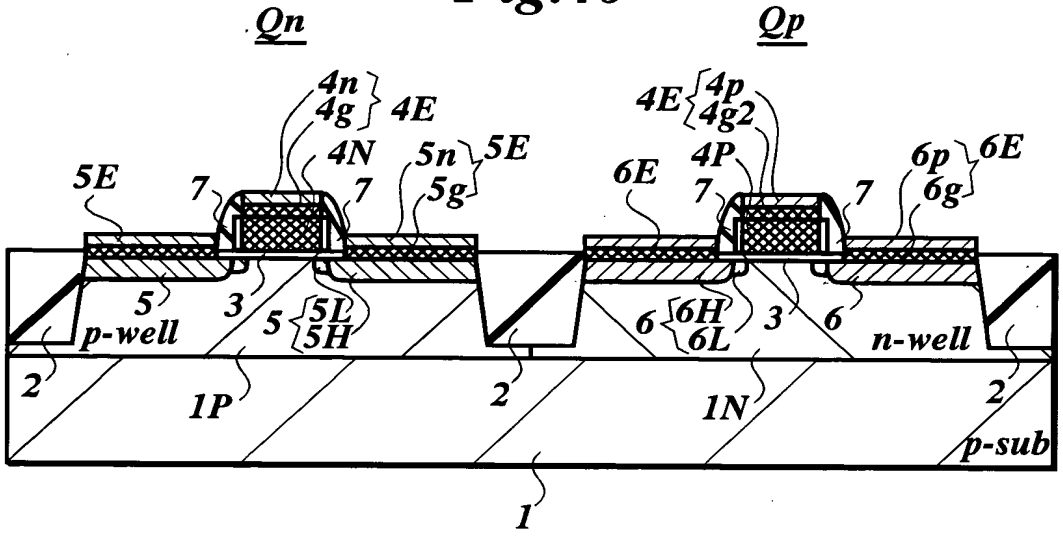
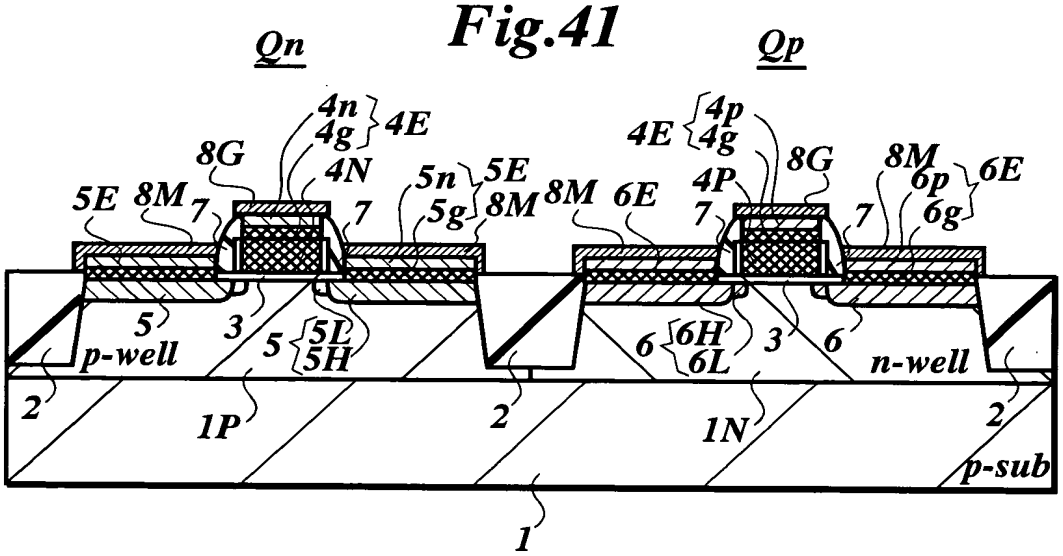

Qn
Qp
4n
4g
4E
4N
5n
5E
5g
5E
7
7
7
7
4E
4p
4g2
4P
6p
6E
6g
6E
5
3
5
5L
5H
p-well
6
6H
6L
3
6
n-well
2
1P
2
1N
2
p-sub
1

Fig.41


Qn
Qp
4n
4g
4E
8G
4N
5n
5E
5g
8M
5E
8M
7
7
8M
6E
4E
4p
4g
8G
4P
8M
6p
6E
6g
7
7
5
3
5
5L
5H
p-well
6
6H
6L
3
6
n-well
2
1P
2
1N
2
p-sub
1